

CLAIMS

1. An audio signal amplifier circuit comprising:

a first, a second and a third differential amplifier which operate at a source voltage with respect to a reference potential or a voltage between the source voltage;

an output stage having a first and a second transistor driven complementarily; a first resistor connected to an input terminal;

a second resistor connected to an output of the first differential amplifier circuit; and

a first and a second feed back resistor connected to an output terminal of the output stage circuit,

wherein the first differential amplifier circuit receives an input signal via the first resistor and inputs an output signal to the second and third differential amplifier circuit via the second resistor, the second differential amplifier circuit drives one of the first and the second transistor, the third differential transistor drives the other of the first and the second transistor, and an output signal of the output stage circuit is fed back to an input of the first differential amplifier circuit via the first feed back resistor and to inputs of the second and the third differential amplifier circuit via the second feed back resistor.

2. The audio signal amplifier circuit according to claim 1, wherein at least one of the first, the second and the third differential amplifier circuit is an amplifier circuit of non-inverting operation and the reference potential is the ground.

3. The audio signal amplifier circuit according to claim 2, wherein the level of the amplitude reference voltage of input and output signal of the first, the second and the third differential amplifier circuit and the level of the amplitude reference voltage of the output signal of the output stage circuit are substantially $1/2$ with respect to the power source voltage.

4. The audio signal amplifier circuit according to claim 3, wherein the second differential amplifier circuit, when the input thereof is a voltage signal of exceeding the $1/2$ voltage, drives the first transistor, and when the input thereof is a voltage signal less than the $1/2$ voltage, turns off the first transistor, and the third differential amplifier circuit, when the input signal thereof is a voltage signal of less than the $1/2$ voltage, drives the second transistor, and when the input thereof is a voltage signal exceeding the $1/2$ voltage, turns off the second transistor.

5. The audio signal amplifier circuit according to claim 4, wherein each of the first, the second and the third differential amplifier circuit is an amplifier circuit of non-inverting operation and the first and the second transistor in the output stage circuit are C-MOSFET transistors.

6. The audio signal amplifier circuit according to claim 5, wherein the first transistor is a P channel MOSFET transistor, the second transistor is a N channel MOSFET transistor, the second differential amplifier circuit, when the input thereof is a voltage signal of less than the $1/2$ voltage, drives the first transistor, and when the

input thereof is a voltage signal exceeding the $1/2$ voltage, turns off the first transistor, and the third differential amplifier circuit, when the input signal thereof is a voltage signal of exceeding the $1/2$ voltage, drives the second transistor, and when the input thereof is a voltage signal less than the $1/2$ voltage, turns off the second transistor.

7. The audio signal amplifier circuit according to claim 6, wherein the first, the second and the third differential amplifier circuit are substantially identical circuits.

8. The audio signal amplifier circuit according to claim 7, wherein at least one of the first, the second and the third differential amplifier circuit is a circuit in which the PNP transistors therein are replaced by NPN transistors and the NPN transistors therein are replaced by PNP transistors.

9. The audio signal amplifier circuit according to claim 7, wherein the $1/2$ voltage with respect to the power source voltage is input to the (+) input sides of the first, the second and the third differential amplifier circuit and an input signal is received at the (-) input side thereof.

10. The audio signal amplifier circuit according to claim 7, wherein each of the first, the second and the third differential amplifier circuit respectively includes a pair of differential transistors, a first and a second load resistors connected respectively to the differential transistors, a current mirror circuit which takes out a voltage signal obtained from the load

resistors as a current signal and a first and a second constant current source which respectively set an operation current for an input side transistor and output side transistor in the current mirror circuit.

11. An electronic apparatus having an audio signal amplifier circuit comprising:

a first, a second and a third differential amplifier which operate at a source voltage with respect to a reference potential or a voltage between the source voltage;

an output stage having a first and a second transistor driven complementarily;

a first resistor connected to an input terminal; a second resistor connected to an output of the first differential amplifier circuit; and

a first and a second feed back resistor connected to an output terminal of the output stage circuit,

wherein the first differential amplifier circuit receives an input signal via the first resistor and inputs an output signal to the second and third differential amplifier circuit via the second resistor, the second differential amplifier circuit drives one of the first and the second transistor, the third differential transistor drives the other of the first and the second transistor, and an output signal of the output stage circuit is fed back to an input of the first differential amplifier circuit via the first feed back resistor and to inputs of the second and the third differential amplifier circuit via the second feed back resistor.

12. The electronic apparatus according to claim 11,

wherein at least one of the first, the second and the third differential amplifier circuit is an amplifier circuit of non-inverting operation, the first and the second transistor in the output stage circuit are C-MOSFET transistors and the reference potential is the ground.

13. The electronic apparatus according to claim 12, wherein the electronic apparatus is a telephone.

14. The electronic apparatus according to claim 13, wherein the telephone is a portable type phone.

15. The electronic apparatus according to claim 12, wherein the electronic apparatus is a portable type electronic apparatus.